

REMARKS

The Office examined claims 1-11 and rejected same. With this paper, none of the claims are amended, none are added and none are canceled.

Claim Rejections under 35 USC §102(b) or §103(a)

At page 2, section 2 of the Office Action, claims 1-4 and 6-11 are rejected under 35 USC §102(b) as anticipated by or, in the alternative, under 35 USC §103(a) as obvious over Mitsuo (JP08-269112, Mitsuo hereinafter).

The present invention relates to a dispersing agent comprising a polyvinyl alcohol polymer (PVA) which has conjugated double bonds in its molecule and the fatty acid ester unit of which are more randomly distributed as compared with conventional PVA-based dispersing agent (see Background of the Invention). Conjugated double bonds are produced by melt heat treatment of the PVA resin using an extruder, whereby the degree of randomness in distribution of the fatty acid vinyl ester units in the PVA resin is enhanced (page 16, lines 20-25 of the instant application). The PVA resin of the present invention has an enhanced degree of randomness in distribution of the fatty acid vinyl ester units, characterized by a block character of remaining fatty acid ester groups of at least 0.5 (Claim 1).

In the Office Action, the Examiner states: "In view of the substantially identical polyvinyl alcohol disclosed by Mitsuo and by applicants, it is Examiner's position to believe that the polyvinyl alcohol of Mitsuo would inherently possess the block character of remaining fatty acid ester groups of at least 0.5." Applicant respectfully disagrees with this assertion.

In both the instant application and Mitsuo, PVA resins are subject to a heat treatment procedure. Mitsuo discloses that the PVA resin may be heat-treated at a temperature range of 120°C to 180°C, more preferably from 140°C to 155°C. The heat treatment time is preferably from 0.5 to 5 hours, more preferably from 1.5 to 5 hours. Alternatively, the PVA resin may be heat-treated by melt-extrusion (paragraph [0015] of English translation of Mitsuo).

Applicant respectfully submits that, based on the following reasons, the heat treatment conditions as taught by Mitsuo are not sufficient to produce a PVA resin of the present invention, i.e. having a block character of remaining fatty acid ester groups of at least 0.5.

1. The optimum heat treatment temperature range in Mitsuo is too low for obtaining a block character of 0.5.

Mitsuo discloses that the PVA resin may be heat-treated at a temperature range of 120°C to 180°C for 0.5 to 5 hours. Mitsuo teaches that if the heat treatment temperature is more than 180°C, the decomposition caused by the heat-treatment occurs intensely. Therefore, heat treatment of higher than 180°C should be avoided. Even so, the more desirable temperature range would be 140°C to 155°C (paragraph [0015] of English translation of Mitsuo).

In the Example 1 in Mitsuo, the heat-treatment of the PVA resin was carried out in a heat-treatment vessel at 145°C for 3 hours (see [0023] of English translation of Mitsuo). This example is similar to what is described in the instant specification as the Comparative Example 1, in which the heat-treatment of the PVA resin was carried out in a heat-treatment vessel at 150°C for 5 hours (page 30, line 22 of the instant specification). The block character of the PVA resin after the heat treatment was 0.47 (Table 3, last row), which is lower than the claimed range in claim 1 (not less than 0.5).

Therefore, it is reasonable to believe that the PVA resin in the Example 1 of Mitsuo, which was heat-treated at a lower temperature (145°C) for a shorter time (3 hours) than that of the Comparative Example 1 of the present application, would have a block character of no higher than 0.5.

For supporting this argument, the detailed description of the Comparative Example 1 in the applicant's specification is submitted in form of a Declaration under 37 CFR 1.132. Applicant manifests that the Comparative Example 1 of the instant application was carried out according to the experimental conditions as described in the instant specification as well as in the Declaration, and results were obtained as shown in Tables 3 and 4 of the instant application as well as in the Declaration. (The Declaration was filed on September 5, 2006)

2. Mitsuo does not teach temperature range and other conditions in melt extrusion that would result in the block character of the heat-treated PVA in the claimed range.

Mitsuo merely mentions: "Moreover, heat-treating by melting extrusion, etc. is also possible (paragraph [0015])." Nowhere in the reference a temperature range and other conditions of the melting extrusion are disclosed.

Because Mitsuo explicitly teaches that a heat-treatment at a temperature of more than 180°C is not desirable, as discussed above, even if a PVA resin were melt-extruded at a temperature between 120° and 180°C, the PVA resin could not be molten sufficiently and would not give a block character of no less than 0.5.

3. The PVA resin of the present invention has unexpected effects over Mitsuo

The present invention is very specific on the block character value of the PVA resin. In the specification, applicant states that: "The block character of fatty acid ester groups remaining in the PVA resin used as the dispersing agent is at least 0.5, preferably at least 0.55. If the block character is less than 0.5, the foaming suppression effect required in suspension polymerization of vinyl compounds such as vinyl chloride is lowered." (Page 18, lines 2-6 of the instant specification)

In order to obtain a block character of no less than 0.5, it is necessary to melt-extrude (melt-knead) the PVA resin. By melt extrusion, the elimination reaction of acetic acid can be proceeded uniformly, so that the conjugated double bond is introduced into the PVA resin and the block character of the PVA is increased. The present invention provides a PVA resin that is melt extruded. The PVA resin has a block character of no less than 0.5 and an excellent foaming suppression effect in suspension polymerization of vinyl compounds.

In the specification, applicant demonstrates the excellent foaming suppression effect in the PVA resin of the present invention by using a series of examples in comparison with the Comparative Example as mentioned above.

The Comparative Example, similar to the PVA resin as disclosed in Mitsuo, has a block character of 0.47. Examples 1 to 14, as described from page 24 to page 34 of the instant specification, contain the PVA resin of the present invention as the dispersing agent. The PVA resin samples are melt-extruded at a temperature between 190°C and 210°C and they have a block character between 0.53 and 0.62. As shown in Table 4 (page 34), Examples 1-14 have high solubility (>99.995%), no or slight fouling buildup, very small amount of foamy polymer (0.004%-0.04%) and a bulk density higher than 0.49. The Comparative Example, on the other hand, has low solubility (<99.995%), noticeable fouling buildup, high amount of foamy polymer (0.42%) and a bulk density of 0.47.

Even though the block character of the PVA resin only increased from 0.47 to >0.5, a seemingly small amount, the difference is very clear and significant. The excellent foaming suppression effect as demonstrated in the present application is nowhere suggested in Mitsuo, and is not obvious in view of same.

It is therefore clear that the conditions for heat treatment as disclosed in Mitsuo cannot be used for producing a PVA resin with a block character of greater than 0.5, the PVA resin of Mitsuo is not suitable for the suspension polymerization of vinyl compounds, and the PVA resin in the present invention is not identical to the PVA resin of Mitsuo, as the Examiner originally alleged.

Based on the foregoing, the polyvinyl alcohol disclosed by Mitsuo would not inherently possess the block character of remaining fatty acid ester groups of at least 0.5. Therefore, claim 1 is believed to be patentable in view of Mitsuo. Applicant respectfully requests the rejections of claim 1 be reconsidered and withdrawn.

Claims 2-4 and 6-11 depend from claim 1. Since claim 1 is believed to be patentable, claims 2-4 and 6-11 are also patentable. Applicant respectfully requests the rejections of these claims under 35 USC 102(b) or 103(a) be reconsidered and withdrawn.

Claim Rejection under 35 USC §103(a)

At page 4, section 3 of the Office Action, claim 5 is rejected under 35 USC 103(a) as being unpatentable over Mitsuo (JP08-269112) in view of Tokita (US Patent No. 6,448,321 B1).

Claim 5 depends from claim 3, which, in turn, depends from claim 1. Since claim 1 is believed to be patentable, claim 5 is also patentable. Applicant respectfully requests the rejections of claim 5 under 35 USC 103(a) be reconsidered and withdrawn.

Conclusion

For all the foregoing reasons, it is believed that all of the claims of the instant application are patentable, and their passage to issue is earnestly solicited. Applicant's agent urges the Examiner to call to discuss the present response if anything in the present response is unclear or unpersuasive.

Respectfully submitted,



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